

Heidegger and Natural Science

by Carl Friedrich von Weizsäcker

Science is one way, and in fact a decisive way, in which everything that is presents itself to us.

Therefore we must say that the reality within which the man of today moves and attempts to endure is, with regard to its fundamental features, determined in increasing measure by what one calls Western European science.

If we reflect on this process, it becomes evident that science has developed in the Western sphere of the world and in its historical era a power formerly nowhere met with upon the earth; in view of this, this power will eventually lay over the entire globe (Heidegger, "Science and Reflection" [VA 45 : QT 156]).

Our century is a century of natural science. In our century natural science seems to reveal itself as the hard core of modern times. If we had to name one philosopher of our century, we would have no choice but to name Martin Heidegger. Heidegger, however, was not a philosopher of natural science. It was neither the point of departure nor the goal of his thought. How does this make sense? The passage by Heidegger quoted above shows how. Heidegger saw the decisive role of science in our time. He suffered under this time, which was his as well as ours. In his younger years this suffering took the form of a demanding critique, and in his

later years it took the form of deep concern and thorough thinking about a fate [*Schicksal*].

Natural science has not up to now understood what Heidegger had to say. Conversely, it seems to me that Heidegger was not able to think natural science down to its foundation. To show this two-sided, unfulfilled task and to take it up as a challenge I have gladly accepted in speaking on Heidegger and natural science today. I will proceed in three steps. First, I would like to discuss once more the historical role, under the title of en-framing [*das Ge-stell*], in which the later Heidegger saw both natural science and technology. Next I will address the ontological problem in a passage in which the early Heidegger decides science's way of seeing. Lastly, I will venture a physicist's response to Heidegger.

1. The En-framing

I shall review with a brief commentary based on two works by Heidegger that deal thematically with science. The first is the lecture "the Age of the World-Picture" (1938; in *Holzwege*, 1950); the second consists of two lectures that belong together, "The Question Concerning Technology" and "Science and Reflection" (1953; in *Vorträge und Aufsätze*, 1954).

The first of these lectures begins with the following:

In metaphysics the essence of being is reflected upon and the essence of truth is decided. Metaphysics grounds an era in that it gives to it a specific interpretation of being and, by means of a specific conception of truth, the ground of its essential form [ZW 69 : QT 115].

Heidegger and Natural Science

The era of which Heidegger speaks is modern times. Heidegger sees modern times as determined by metaphysics—and thus by a decision about the essence of truth—although this is a modified form of the metaphysics in Greek philosophy. Heidegger enumerates five essential phenomena of modern times: science, machine technology, aesthetics, culture, and de-divination. The lecture is confined to modern science, which, as distinct from the *doctrina* and *scientia* of the Middle Ages and the Greek ἐπιστήμη, is essentially research [*Forschung*]. Research in a realm of being, for example, nature, projects beforehand a specific outline of the essence of this being—in this case of natural events. Heidegger wrote in this first lecture that modern physics is mathematical by means of “the projection of that which is to be nature in the future for the sought-after knowledge of nature—the connection of the motion of self-contained spatiotemporal points of mass” (ZW 72 : QT 119). In the later lecture (WB 60–61 : QT 171–172) Heidegger sees the mathematical preprojection carried on through all transformations of modern physics, even down to quantum theory’s critique of objects.

What is the aim of the preprojection? As Heidegger says:

The facts are to . . . be objective. The procedure must therefore represent the changeable in its changing, bring it to a standstill and nevertheless allow the motion to be a motion . . . The constancy of the changing in the necessity of its course is law. Facts first become clear as the facts that they are within the horizon of rule and law. . . Only because modern physics is essentially mathematical can it be experimental [ZW 73–74 : QT 120–121].

This passage provides an insight into the essence of physics, which ran throughout Kant and is related to Einstein's principle that "theory first decides that which is measurable."¹ This preprojection makes it possible for science to become an industry. As Heidegger reminds us:

The scholar disappears. His place is taken by the researcher, who exists in research enterprises" (ZW 78 : QT 125).

What conception of being and what concept of truth are grounds for science turning into research? . . . Nature, in advance calculation, and history, in historical verification, are, so to speak, placed [*gestellt*] . . . This objectification of being is achieved in representational thought that aims at bringing every being before itself in such a way that the calculating human being can be secure, and that means certain. Science first comes to be research, and only then, when truth is transformed into the certainty of representational thought [ZW 80 : QT 126–127].

It is with the domination of representational thought that there is a world-picture for the first time—hence the title "The Age of the World-Picture":

World-picture essentially means, therefore, not a picture of the world but rather conceiving the world as picture [ZW 82 : QT 129].

The fundamental event of the modern age is the conquest of the world as picture. The word "picture" [*Bild*] now means: "the product of representational production" [*das Gebild des vorstellenden Herstellens*] [ZW 87 : QT 134].

1. Cp. W. Heisenberg, *Der Teil and das Ganze, Gespräche im Umkreis der Atomphysik*, München 1969, p. 92.

The lecture that was written fifteen years later, "The Question Concerning Technology," enhances the connection to technology indicated in the former lecture. For Heidegger technology is not applied natural science; on the contrary, it is a specific mode of truth or, as he now says, of uncovering [*Entbergen*], which defines natural science itself (FT 20, 21 : QT 12, 13).

Technology essences [*west*] in the realm where uncovering and unconcealment, where *'αλήθεια*, where truth occurs [FT 21 : QT 13].

The uncovering that holds sway in modern technology is a provoking [*Herausfordern*] that places [*stellt*] the demand on nature to yield energy, which as such can be provoked and accumulated [FT 22 : QT 14].

Heidegger, in the style of his later works, is playing here on the words associated with *Stellen* ["placing" or "putting"].

That which is thus disposed [*das so Bestellte*] has its own condition [*Stand*]. We call it stock [*Bestand*] [FT 24 : QT 17].

Who carries out the provocative placing whereby that which is called real is uncovered as stock? Obviously, man . . . But man does not have unconcealment, wherein that which is real shows itself or withdraws at any given time at his command. . . . Only insofar as man for his part is already provoked to provoke natural energies can this disposing uncovering occur [FT 25 : QT 18].

We now call that provoking demand, which brings man to dispose of that which uncovers itself as stock, the *en-framing* [FT 27 : QT 19]. Modern physics is the herald, still unknown in its origin, of the en-framing [FT 29 : QT 22].

HEIDEGGER MEMORIAL LECTURES

I suppose that anyone listening to my present lecture does not want to explain away his consternation by means of an easy rejection of the Heideggerian way of speaking. However, it is at least fitting to sketch carefully this really strange language in conventional language. It is a familiar thought today that natural science and technology make nature available to modern man in a mode of representability, that they make nature representable in the form of availability. Technocrats think: We rule because we know; we know in order to rule; knowledge is power. Social critics and conservationists invert these same thoughts: The form of this knowledge is defined by the will to power [*Machtwillen*]; the untrustworthiness of such science is then often asserted, based upon its devastating effects. Both versions follow the same schema but with opposing values. Man appears in both as the one who acts, as the author of events—by means of his knowledge. That true knowledge is useful is presupposed; therefore natural science appears true to the technocrats and questionable to the social critics and conservationists.

Do Heidegger's thoughts belong to either of these two versions? He will never rank among the technocrats. Does he belong in the group called somewhat loosely "social critics and conservationists?" That his subjective feeling in the face of the world of technology was a feeling of alarm, even of hostility, is only too clear. One could refer to a sentence from his lecture on technology: "Thus, where en-framing prevails there is danger in the highest sense" (FT 36 : QT 28). Heidegger continues with the Hölderlin quotation:

Where, however, danger is, grows
the saving also.

This is not merely a hope for an unknown saviour. To be sure, not only in the *Der Spiegel* interview but also in a discussion circle in my home in Hamburg, unforgettably, he said to me, "Only God can still save us." But the connection of truth, danger, and saving is indissoluble for him. "The essence of technology is, as a *mittence* of uncovering, the danger" (FT 36 : QT 28). "*Mittance*" is used here as history, specifically, as history whose author is not a man who behaves as if he were independent. Uncovering is truth and thus, retranslated conventionally, the sentence reads: "The essence of technology is the danger, because this essence belongs to the history of truth."

In substance something doubly strange is maintained here: epistemologically—the essence of technology is not the application of truth but truth itself; historically—the truth itself is the danger. It is equally the saving.

The granting [*Gewährende*], which sends one way or another into uncovering, is as such the saving [FT 40 : QT 32].

As long as we represent technology as an instrument we remain stuck in the will to master it. We miss the essence of technology [FT 40 : QT 32].

The essence of technology is in a deep sense ambiguous. Such ambiguity points to the mystery of all uncovering, that is, to the mystery of truth [FT 41 : QT 33].

The irresistability of the disposing and the holding back of the saving pass by one another just as the paths of two stars in motion among the heavenly bodies. But it is this—their passing one another by—that is concealed in their nearness [FT 41 : QT 33].

HEIDEGGER MEMORIAL LECTURES

I prefer not to comment further on these passages. In the composition of his late style, as a sign of his isolation, Heidegger is also precise in the saying, the pointing out, and the passing over in silence of that for which he did not have the capacity to say more.

2. Ontology, Logic, and Truth

The dialogue between Heidegger and natural science cannot be guided by a few isolated texts of his late period. These texts belong to the last phase of his life's work. The decision that determines the relationship between natural science and Heidegger's thought falls in his early period. It took place before the first sentence of *Being and Time* was written. The immense labor of thought of his early period is just now beginning to become known to the reading public through the publication of his Marburg lectures. In these lectures Heidegger still speaks the language of science and traditional philosophy; in this language he conducts a dialogue between science and traditional philosophy, and it is quite adequately expressed. He lays bare lucidly and in detail the foundations of this thought and the unclarified questions lying within them. The resolution to use a self-styled terminology in his published work, which begins with *Being and Time*, is a consequence of this critical analysis of language, that is, of traditional thought. It is here, however, that the direct dialogue with traditional thought breaks off; from now on to understand Heidegger's expressions one must accommodate himself to his language as well as to his position in thought [*denkerischen Position*]. Natural science, however, will not adopt Heidegger's new diction. For that reason, the Heideg-

ger of the Marburg lectures is its partner, if it is to be a matter of a dialogue and not a mere hinting; only following such a dialogue is a return to the texts that we read at the beginning meaningful.

Up to now, in the *Gesamtausgabe* two volumes of lectures have been published: Volume 21, *Logik: Die Frage nach der Wahrheit*, and Volume 24, *Die Grundprobleme der Phänomenologie*.³ Here phenomenology means ontology. In these volumes natural science does not become a theme. In order to carry on a dialogue with natural science, permit me, in anticipation of the third part of my lecture, to touch on the relation of natural science to logic and ontology.

Natural science factually develops toward a systematic unity. The multiplicity of disciplines does not stand in the way of this; on the contrary, it contributes to the acceleration of systematic advance, of which it is the consequence. It appears that in all areas that we are able in any way to include in the title "nature" that the same fundamental laws are valid. Physics is the science that formulates these fundamental laws. This development has long been manifest for the area of the inorganic; in recent decades it has made rapid advances in the area of organic life. One can say at the very least that physicalism—that is, the hypothesis that the laws of physics are the only fundamental laws—is heuristically successful and is nowhere refuted. There is, furthermore, no universally recognized line of demarcation that permits the exclusion of man or certain aspects of human existence from subsumption under the concept of nature. Later I shall return

3. Martin Heidegger, *Gesamtausgabe*, Frankfurt a. M.: Vittorio Klostermann, 1975.

HEIDEGGER MEMORIAL LECTURES

to this problem, which is quite unresolved in the scientific consciousness of our time.

Physics itself develops toward a systematic unity. The central discipline of this unity today is quantum theory, which acquired its definitive form under the hands of Bohr and Heisenberg about half a century ago—in those years in which Heidegger was delivering the Marburg lectures and writing *Being and Time*. General or abstract quantum theory can be described as a nonclassical probability calculus. The word “nonclassical” as it is used here signifies formally a multiplicity of possible events that is based upon the estimation of probability, which departs from that which one would derive by the use of classical propositional logic (Boolean algebra). One speaks conveniently of “quantum logic.” The foundation of this nonclassical logic lies in a deviation from classical ontology that is not worked out by the physicists but only verbally paraphrased. In quantum theory one can define a possible event only with regard to a possible observer. Here, for the first time in modern physics the subject-object relationship becomes thematic.

It is not my task in this lecture to analyze further quantum theory. What has been said is enough to show us that Heidegger’s analysis of the foundations of ontology and logic, if it proves to be correct, is of direct significance for the core of all natural science. Naturally Heidegger himself was fully aware of this even before he became acquainted with quantum theory.

The first part of the lecture course, *Die Grundprobleme der Phänomenologie* (Summer 1927), which was delivered shortly after his writing *Being and Time*, discusses fundamental theses of traditional ontology in four chapters:

Heidegger and Natural Science

1. Kant's thesis: "Being is not a real predicate [*kein reales Prädikat*]".
2. The Scholastic-Aristotelian distinction of essence and existence [*Essenz und Existenz*].
3. The Cartesian confrontation of *res extensa* and *res cogitans*.
4. The logical characterization of Being by means of the copula in the predicative statement [*Satz*].

The introduction establishes the problem as well as Heidegger's projection of its resolution. The ontological difference, "that is, the separation of Being and beings" (22), makes precise the question concerning Being:

Being is the genuine and only theme of philosophy [15].

Being is as a priori prior to beings. Even today the meaning of this a priori—that is, the meaning of the "prior"—and its possibility are not clarified. . . . The "prior" is a temporal determination, but one that is not situated in the chronological order of time, which we measure with the clock. . . [27]. We encounter the Being of a being in the understanding of Being. It is understanding that first of all reveals [*aufschliesst*] or, as we say, discloses [*erschliesst*], something such as Being [24].

There is Being only when there is disclosedness, that is, when truth is. . . . There is Being only when truth—that is, *Dasein*—exists [25]. Ontology does not allow itself to be grounded purely ontologically. Its own rendering possible [*Ermöglichung*] is referred back to a being, that is, to something ontic—*Dasein* [26].

Ontology has an ontic foundation; [in the words of Aristotle:] The first science, the science of Being, is theology [26].

If temporality constitutes the meaning of the Being of human *Dasein*, but the understanding of Being belongs to the con-

HEIDEGGER MEMORIAL LECTURES

stitution of the Being of *Dasein*, then this understanding of Being must also become possible only on the ground of temporality. . . . The horizon from which something like Being in general becomes understandable is time. We interpret Being from time [22].

The first chapter then immediately paves the way for the second in that in Kant's thesis, Being is not a real predicate, he interprets Being as *existentia* and real predicate as a constituent of *essentia*. The ontic—that is to say, the theological—basis of classical ontology is evident in that Kant developed his thesis within the critique of the proofs of God. Kant's explanation of Being as "position" suggests a relation of objects to the faculty of knowledge [*Erkenntnisvermögen*], and thus to the ontic ground of ontology in the knowing subject. To this Heidegger joined the phenomenology of intentionality: "Perception lets that which is present-at-hand be encountered and as such lets it be freely given" (98). Being as presence-at-hand is a further clarification of the conception of Being.

The second chapter concludes from the theses of the Scholastics from Thomas to Suarez:

. . . the distinction of *essentia* and *existentia in ente creato* depends upon whether the interpretation of Being in the sense of existence is oriented in general toward actualization [*Verwirklichung*], that is, toward creation and production [138].

If created being as that which is created is to be possible, then actuality [*Wirklichkeit*] must be able to be added to possibility, that is, both must in reality be distinct [139].

Heidegger traces this pattern of thought back to Greek ontology. For him the "guiding clue for its interpretation" is "the view of production":

The potter shapes a pitcher out of clay. . . . This is produced by looking [*Hinsehen*] at the anticipated form [*Aussehen*] of the thing to be shaped, to be imprinted [*zu bildenden, prägenden*]. This form of the thing, which is anticipated and sighted beforehand, is that which the Greeks mean ontologically by εἶδος, ἰδέα. The figure [*Gebilde*] that is shaped [*gebildet*] according to the original [*Vorbild*] is as such the image [*Ebenbild*] of the original [150].

By chance the Greek view of production does not allow every being to appear as that which is produced. The figure is produced from material that is found beforehand. "Thus in production we hit precisely upon that which is in need of production" (164). However, for just this reason:

. . . that which is in need of production can in general be understood and discovered only within an understanding of the Being of production [163].

The concepts of matter and material have their origin in an understanding of Being that orients itself toward production [164].

However, can every being "be conceived as that-which-is-present-at-hand" (169)? Man can least of all. This leads to the modern subject-object distinction.

The third chapter deals with the distinction between person and thing [*Sache*], essentially as it is defined in Kant's practical philosophy:

Thus the specific kind of Being of the moral person was situated in free action [*Tun*]. Kant once said: "That is intellectual whose concept is an action." . . . The "I" is "I act," and as such it is intellectual [200].

Those with intelligence, moral persons, are subjects whose Being is an acting [*Handeln*] [200]

HEIDEGGER MEMORIAL LECTURES

Heidegger's critique of Kant, which leads further, begins thus:

There is present in Kant a peculiar omission insofar as he does not succeed in originally determining the unity of the theoretical and practical "I" [207].

Kant speaks of the *Dasein* of the person as if it were the existence [*Dasein*] of a thing . . . There already lies enclosed in the concept of the thing in itself—whether or not it is able to be recognized in its whatness [*Washeit*]*—the traditional ontology of Being-present-at-hand* [209].

This leads to an exposé of Heidegger's ontology of *Dasein* as Being-in-the-world, which cannot be summarized here.

The fourth chapter begins with the interpretation of the copula in Hobbes, Mill, and Lotze. It is to be regretted that the early Heidegger treated this tradition and Husserl but not the central figure of modern logic, Gottlob Frege. Heidegger's critique of Frege would have become the Rhodes of his leap through the cold fire of logic. Heidegger's special problem in this chapter is the indifference of Being in the sense of the copula compared to its interpretation according to the classical ontological distinctions, as essence or existence, as person or thing [*Sache*]. I leave open whether or not Heidegger's concept is logically tenable. What is essential for us is the concept of truth that he uses for its explanation.

The primary character of the assertion [*Aussage*] as "pointing-to" [*Aufweisung*] must be retained. Only from this character of "pointing-to" is the predicative structure of the assertion to be defined. Accordingly, predication is primarily an unfolding of that which is given in advance, namely, an unfolding that shows [*ein aufzeigendes Auseinanderlegen*] [298].

Heidegger and Natural Science

As spoken, the assertion is communication. . . In and through communication one *Dasein* comes with another, the one addressed, into the same relation of Being toward that about which the assertion is, that about which the talk is. . . From all this it becomes clear that the assertion does not have a primary function of knowledge, only a secondary one. A being must already be unveiled for an assertion about it to be possible [299].

From this it then follows that the "is" can be indifferent in its meaning because the different mode of Being is already fixed in the primary understanding of beings. . . The indifference of the copula is not a deficiency; rather it characterizes only the secondary character of all asserting" [301].

Heidegger thus establishes a rank and file. The statement of an assertion as a "pointing-to" is primary compared to its parts. The concept is defined as a possible part of the statement, not the statement as a composition of concepts. The disclosedness of beings is primary compared with the assertion. Truth as unconcealment is primary compared with the truth of the statement. Statements are either correct or incorrect, and only by means of this binary structure is logic as science rendered possible; the theory of correct inference presupposes the possibility of incorrect inference. Truth as unconcealment, however, is the precondition of the distinction between correct and incorrect:

Dasein exists in the truth, that is, in the unveiledness of itself and the beings toward which it comports itself. Only because it is already existing essentially in the truth can it as such go astray [*irren*] and can there be the covering-up, dissimulation, and closing-off [*Verdeckung, Verstellung und Verschlossenheit*] of beings [308].

HEIDEGGER MEMORIAL LECTURES

And the recourse to the ontic basis of ontology: "There is truth, unveiling, and unveiledness only when and so long as *Dasein* exists" (313).

I need not relate how from these decisions Heidegger's path beyond *Being and Time* leads to the late philosophy with profound inner necessity. However, how ought a present-day physicist—a man who actively and with inner agreement passes through the last phase of the path of metaphysics, which was described by the late Heidegger—respond to these decisions? How do truth and beings, danger and saving, comport themselves for him?

3. A Physicist's Response

Up to now physicists have not understood what Heidegger had to say to them. Indeed, for that reason I cannot speak in the name of physics but only in my personal capacity as a physicist. But I am also no longer speaking as an interpreter of Heidegger, because I do not believe that he was able to think through deeply enough the reality [*Realität*] of physics. In relation to Heidegger the response also remains a risky undertaking.

It seems to me that Heidegger saw the historical role of natural science more correctly than either its supporters or its critics. He saw that natural science is fatefully determinative for us, because for modern times it is the central, the authentic, form of truth. Complete clarity on this first came to him in the course of his life, notwithstanding that it was the consequence of the decisions of his Marburg philosophy. This may be a contributing reason for the fact that his late phase in academic philosophy is as yet valued less than the earlier. In

the earlier period he still shared the traditional error that natural science is a regional science. This view is indeed not only one that is clear at first glance, even one that is a seemingly self-evident scientific and theoretical statement, but it was also (and still is today to some extent) a Maginot Line, the bastion of a defensive strategy against classical physics' projection of reality. This bastion was to protect such positions as vitalism in biology, the attempt of the Dilthey-Rickerts era to establish the human sciences as essentially independent from the natural sciences, Husserl's regional ontologies, and, in radical simplicity, Cartesian dualism. In the early Heidegger are found more or less peripheral agreements with many of these positions that circulated in his academic environment. However, the direction of the thrust of his critique was opposed to all of them from the very beginning.

If the hope of establishing positive sciences such as vitalist biology or an understanding human science continues in the periphery, in the presupposed regionalization of beings, to avoid the diminishing of reality that lay in the classical projection of physics, he nevertheless destroys this hope at its core. All these sciences represent the being that they study as an object, even if the subjective intention of their representatives proposes the opposite; compare the above extract from "The Age of the World-Picture" with regard to the science of history. These sciences are forced to this end through their claim to scientificity, that is, certainty. The intersubjectivity of science appears in them *de facto*, not founded through a common Being-in-the-truth of the scientists; rather the scientists' communication about their common truth has its root in their claim for the objectivity of the research results.

HEIDEGGER MEMORIAL LECTURES

Lying next to the great project of fundamental ontology, the regional ontologies remained for the early Heidegger equally peripheral. Fundamental ontology was still conceived by him as a scientific phenomenological philosophy which, with the ontological core of the Cartesian question, seriously made the distinction of existing beings from present-at-hand beings, of the existential [*Existenzials*] from the categorical. This is also still a strategy of regionalization. Fundamental ontology was now able to appear as that science that does not objectivize. The compromise character of this position is revealed in the fact that the second volume of *Being and Time* was not published as well as in the renunciation of Heidegger's later writings of the claim of being science. Heidegger's late philosophy, which no longer seeks to occupy a place in the province of science, first gained its clear view of science as a unitary form of truth—the central one for modern times.

This great advance, however, is paid for with a serious loss; and it is with good reason that the experience of running aground accompanies Heidegger's later path of thinking over long stretches. As a physicist I attempt to characterize the loss of science this way: it is the loss of the possibility of even asking about the ground of the factual success of science. In the Marburg lectures, Being as presence-at-hand is the ontological projection that renders science possible. It is ontically founded in the constitution of the Being of man as a producing being [*eines herstellenden Wesens*]. This appears a priori; the physicist would say it is known from prescientific experience. The fundamental ontologist searches for a more complete existential determination of man; in this search he has already left the realms of production and presence-at-

hand safely behind him. This is a research situation and not an answer. One may hope, should the existential structures be disclosed, to determine in them more accurately the place of production. The late philosophy, however, sees man in a history that is interpreted as *mittence* and in which the uncovering of beings in the en-framing is the last, still-recognizable step. How this truth stands in relation to other modes of truth remains concealed for us precisely by means of this *mittence*. The discussion of *das Ereignis*, which is still blocked [*verstellt*] by the en-framing, remains a sibylline strain.

As a physicist I believe that one of the reasons for this veiledness lies in the fact that the path of science has not come to an end. This obliges me to indicate that which is meant by going-to-the-end [*Zu-Ende-Gehen*] of this path. To do this I shall use language immanent to science while tying this to the remarks made in the second part.

Natural science develops simultaneously toward a systematic unity of laws and an unlimited multiplicity of disciplines. The conceptual form of its fundamental laws has the possibility of this multiplicity as its logical consequence. For example, fundamental laws of a determinate and presumably penultimate degree have the mathematical form of differential equations. A differential equation has, in general, endlessly many solutions; consequently, it characterizes a class of possible functions. The individual disciplines appear then as theories of certain partial classes of the totality of all solutions or certain approaches to solutions of a partial class. To take the path of natural science to the end does not mean to exhaust the abundance of reality that is describable in terms of natural science, because this is impossible; it means to

HEIDEGGER MEMORIAL LECTURES

discover ultimate fundamental laws. Axiomatic mathematics shows how little a science is exhausted through the statement of its fundamental laws. The axioms of Euclidean geometry can be listed on a few printed pages; the abundance of geometrical forms and their relations is an inexhaustible wealth. For their part the fundamental laws, should there be such, again are not the ultimate truth of Being. Heidegger has made clear in a passage cited above that the concept of law already presupposes a projection of the kind of Being of beings as, in the sense of Heidegger's terminology, "representable" [*Vorstellbaren*]. What we want to know philosophically is whether or not there are fundamental laws of physics and, if so, what they define. I will assume that they exist so as not to extend the argument. What they define is not a region of beings but a way of understanding beings. How is this way defined?

The hypothesis that I personally follow is connected with Kant: the fundamental laws of physics express only the conditions of the possibility of objectifiable experience. They are not only regulative principles of pure understanding but of positive laws—just as Kant sought them in the *Metaphysical Elements of Natural Science* and in the *Opus Postumum*; by means of the systematic unity of natural science the problem of irreducible special natural laws is abolished. The abstract quantum theory is a general theory of probability. Probability is quantified possibility. Possibility here is a predicate of future events; thus it is a temporal modality. Experience likewise is a temporal concept; experience means to learn from the past for the future. Objectifiable experience is that which underlies logic. Logic implies the distinction between correct and incorrect. Logic, applied to experience,

requires that experience be formulated into decidable alternatives, that is, yes-no decisions in the sense of information theory. The hypothesis says, therefore, that the fundamental laws of physics formulate nothing but the logic of objectifiable experience.

So far, the hypothesis, if I am not mistaken, conforms with no deviation to Heidegger's thought. It has, however, three universal characteristics that go beyond his explicit thought. In the first place, it asserts the necessary systematic unity of natural science on a philosophical basis; it directly breaks with the methodical separation of positive science and philosophy insofar as philosophy remains conceptual. In the second place, it would make comprehensible why a regional demarcation of natural science has never been clearly justified. Natural science in the sense projected here is presumably coextensive with conceptual empirical thought in general. The establishment of this thesis, of course, would require a renewed analysis of conceptual thought and thus of the essence of the concept. From this follows a third, still more comprehensive remark. Science thus defined does not stop at man insofar as something can be said conceptually about him. Besides, because of the theory of evolution the continuity of man with nature has become a permanent part of science. In this situation phenomenological knowledge and empirical natural scientific knowledge are not able, as in former phenomenological approaches, to comport themselves toward one another according to the traditional *a priori* and *a posteriori* schema. The reflective or phenomenological self-knowledge of the subject can be checked or corrected by means of causal and natural scientific knowledge. I am justifying here only what has been occurring for a long time in

HEIDEGGER MEMORIAL LECTURES

today's science against untenable philosophical defensive positions.

The question concerning the ground of the possibility of natural science is thus joined together in the closest way with the question concerning the ground of the possibility of conceptual thought in general. Here today's science permits an explanation of the ontic foundation of ontology through the insertion of man into nature, that is, the insertion of his history into the history of organic life. The order of precedence discussed above in three steps—unconcealment, statement, concept—has an antecedent in animal behavior. Animal behavior has its own correctness and incorrectness. It is based upon the fact that behavior can succeed or not succeed, but is not identical with such success or failure. Correctness of behavior is *adaequatio actionis ad rem*, adaptation to the conditions of the ecological niche. It is not whether or not the behavior succeeds in the particular case that constitutes its correctness or incorrectness but, on the contrary, whether or not it is in principle adapted to the situation. *Adaequatio* here is not the accordance of the image with the original but the adaptedness of key and lock. Such behavior correctly characterized is the antecedent of the general principle. In turn, the resolution of the principle—which corresponds to the unity of action—into general concepts is first a human accomplishment, which is brought about by means of the faculty of representation; it signifies the step from the capacity to act to the ability to accumulate power. Representation is above all not representation of present-at-hand things; it is representation of possible actions. Thus in *Being and Time* Heidegger puts readiness-to-hand before presence-at-hand. The particular case—hence, that which

the empirical theory of knowledge considers as the given—is genetically a late stage of knowledge; it is in reality only the specialized concept. Genetically, there first are statements (“fire!”), then concepts (“the fire,” “to burn”), and then proper names (“the burning of Moscow”). There are units of action, however, only in an already disclosed environment. This disclosedness exists beforehand and implicitly; it is not represented and has no need of representation. Becoming conscious of it is something other than representational thinking.

Such considerations accomplish in the midst of science the philosophical circle often mentioned by Heidegger. They take advantage of the language of empirical research on behavior in order to describe the preconditions of conceptual empirical thought, its genetic *a priori*. This language of empirical science factually presupposes the structures of nature, which are explained causally by physics from fundamental laws. These fundamental laws, however, formulate the way that beings can be given to conceptual-empirical thought, and hence also how organic life, man, and his conceptual-empirical thought itself can be so given. Herewith phenomenology remains a methodic *a priori*—which, nonetheless, can establish no claim of certainty—an *a priori* of the step into the circle. For one can explain only causally what one somehow has already perceived and to that extent has already understood.

I would like to make the transition to my conclusion by means of a personal remark. The position toward natural science from which this response issues departs fundamentally from that of Heidegger in each phase of his thought. Heidegger could not have been deluded about this in our

HEIDEGGER MEMORIAL LECTURES

personal meetings, which were carried on through four decades. He never attempted to dissuade me from my position; he only constrained me, by means of questions that hit the mark, to make it clear to myself. The presentation of a position that would not have come to understand itself without his aid is a thanks that we can offer to a great man. If I purport to see more in a few places than he was able to see, I am aware that without a doubt I have not been able to perceive that which he had a presentiment of, saw, and expressed in other central places.

I am convinced that in his late period he saw correctly the signature of our age in a decisive point. En-framing is the resolution of reality into conceptual acts of representation and the attempt at the restoration of the whole as a sum of interrelated elements. This conceptual restoration of a whole is today called system theory. This is the inevitable world-picture of the world of willing and understanding, which is open as a possible social way of comportment at the latest since the transformation of nature through agriculture, or perhaps earlier, since the hunting culture. This way of thinking is, by means of the same essential features, truth "as making visible structures and as mortal danger." This truth is at the same time untruth, because the parts represented as independent, be they atomic objects or atomic functional units, are themselves products of the concept. They are reality reflected in a mirror unconscious of itself; they are not themselves real. The saving is, in the midst of this world of the graspable, already there ungraspable. Accessible to planning, and therefore a duty, is the seeking and entering of paths in danger. The confidence in security through planning, the so-called pragmatic optimism of planning, is a means of

Heidegger and Natural Science

preventing access to the saving truth. The suffering of the late Heidegger from our world was his gift to it. For with that he did not evade that world or that duty.

Key to Abbreviations

German Texts

- Hw *Holzwege*. Frankfurt a. M.: Vittorio Klostermann, 1950.
- VA *Vorträge und Aufsätze*. Pfullingen: Verlag Günther Neske, 1954.
- UzS *Unterwegs zur Sprache*. Pfullingen: Verlag Günther Neske, 1959.
- WdW *Vom Wesen der Wahrheit*. Frankfurt a. M.: Vittorio Klostermann, 1967.
- PLW *Platons Lehre von der Wahrheit*. Bern: A. Francke Verlag, 1947.
- SvG *Der Satz vom Grund*. Pfullingen: Verlag Günther Neske, 1957.
- WhD *Was heisst Denken?* Tübingen: Max Niemeyer Verlag, 1954.

HEIDEGGER MEMORIAL LECTURES

- ZSD *Zur Sache des Denkens*. Tübingen: Max Miemerer Verlag, 1969.
- ZW "Die Zeit des Weltbildes," in Hw (p. 69-104).
- FT "Die Frage nach der Technik," in VA (pp. 13-44).
- WB "*Wissenschaft und Besinnung*," in VA (pp. 45-70).
- SZ *Sein und Zeit*. 12th ed. Tübingen: Max Niemeyer Verlag, 1972.
- DS *Die Kategorien- und Bedeutungslehre des Duns Scotus*. Tübingen: J. C. B. Mohr, 1916.

English Texts

- OTB *On Time and Being* (Translated by Joan Stambaugh. New York: Harper and Row, 1972 (*Zur Sache des Denkens*)).
- WCT *What Is Called Thinking?* Translated by J. Glenn Gray and Fred Wieck. New York: Harper and Row, 1968 (*Was heisst Denken?*)
- BT *Being and Time*. Translated by John Macquarrie and Edward Robinson. Oxford: Basil Blackwell, 1962 (*Sein und Zeit*).
- WL *On the Way to Language*. Translated by Peter D. Hertz. New York: Harper and Row, 1971 (*Unterwegs zur*

Abbreviations

Sprache, except for “Die Sprache” [pp. 9-34], which appears in translation in PLT).

- PLT *Poetry, Language, Thought*. Translated by Albert Hofstadter. New York: Harper and Row, 1971 (in addition to “Die Sprache” contains selected texts from *Holzwege* and *Vorträge und Aufsätze*).
- BW *Martin Heidegger: Basic Writings*. Edited by David Farrell Krell. New York: Harper and Row, 1977 (selected texts ranging chronologically from *Sein und Zeit* to *Zur Sache des Denkens*.)
- QT *The Question Concerning Technology and Other Essays*. Translated by William Lovitt. New York: Harper and Row, 1977 (“Die Frage nach der Technik,” “Die Zeit des Weltbildes,” and “Wissenschaft und Besinnung”).

Glossary

Only the most important terms that recur throughout the text have been included in this list. It is meant as source for ready reference in reading the lectures. The full meaning and justification of these translations lies in the lectures—what Hegel had to say about prefaces and philosophy applies *mutatis mutandis* to this glossary and the lectures in this book.

der Anfang: beginning

anfangend: beginning

(For Heidegger *Anfang* means more than a mere starting point in time or history; it also has the sense of a beginning that remains with and is determinative of that of which it is the beginning; in other words, it has the sense of the Greek *arche*.)

das Anwesen: presencing

die Anwesenheit: presence

das Anwesende: that which is present (or presencing)

die Anwesung: presencing

(Unless otherwise indicated in the text, when “presence” or variations thereof occur, it is a translation of a form of *Anwesen*.)

der Bereich: realm, sphere, region

HEIDEGGER MEMORIAL LECTURES

das Bergen: sheltering

Entbergen: uncovering

Verbergen: concealing

Verborgenheit: concealment

das Denken: thinking, thought

Andenken: recollection, remembering

Nachdenken: reflection

das zu-Denkende: that which is to be thought, that which is
for thinking

Vordenken

Vorausdenken

vorbereitendes Denken

} preparatory thinking, thought

(At stake in each of the German terms for preparatory thought is the same: it is a thinking that runs ahead and prepares the way for that which is to come after it. However, as the lectures in the present book make clear, this is not a calculating Promethean forethought but rather a thinking that helps to clear the way for that which is to follow. Indeed, by its very existence it helps to bring about that which is to follow.)

das Ereignis: (This term has been left untranslated except for the interpretation that is given in the lectures, especially that of Professor Marx. The reason for this is to preserve its character of being "that which is for thinking," "that which is to be thought"—a facile translation of *Ereignis* would have precisely the opposite effect.)

eigen: proper, appropriate

eigensten: ownmost

eigentlich: authentic

ereignen: to appropriate

sich ereignen: to come to pass

erschliessen: to disclose

die Erschlossenheit: disclosedness

Glossary

das Freie: free dimension

die Gegenwart: presence, present

das Gegenwärtige: that which is present

die Gegenwärtigkeit: presence

das Geschehen: occurrence

gewähren: to grant

das Gewährende: the granting

der Grund: ground, reason, rational ground,

gründen: to ground

begründen: to ground rationally

begründend: rational

(The sense of reason or rational is lent to *begründen* and *Grund* not only by their dictionary definitions but also, and more importantly, from Heidegger's disclosure of what these terms signify in the history of Western thought; compare especially Professor Marx's lecture.)

die Herkunft: origin

herrschen: to prevail, rule

die Herrschaft: dominion, dominance, domination, rule

beherrschen: to govern, rule

beherrschbar: masterable

hüten: to watch over

die Irre: errancy, going astray

das Irren: erring

der Irrtum: error

das Beirren: going or leading astray

HEIDEGGER MEMORIAL LECTURES

die Kehre: the turning

die Lichtung: lighting, clearing

lichten: light up, clear

das Nichts: Nothing

das Offene: open region

offenbar: manifest, open

das Präsenz: presence

das Rettende: the saving

erretten: to save

die Sache: matter

das Sagen: Saying (of Being and not man)

die Zusage: address

schicken: to send

die Schickung: sending

das Schicksal: fate

das Geschick: destiny, mittence

geschicklich: fateful

zuschicken: to send on

das Sein: Being

Seiende: being, a being, beings

Seiende im Ganzen: beings as a whole

Vorhandensein: Being-present-at-hand

Vorhandene: that-which-is-present-at-hand

Zuhandensein: Being-ready-to-hand

Zuhandene: that-which-is-ready-to-hand

Glossary

die Sprache: language
sprechen: to speak
der Anspruch: appeal, claim
entsprechen: respond, correspond

das Stellen: placing, putting
das Ge-Stell: the en-framing
Bestellen: disposing
Herstellen: producing, production
Vorstellen: representational thought
die Vorstellung: representation

(The explanation of this group of terms is to be found in the lectures themselves. However, two comments are in order concerning *das Ge-Stell* and *das Vorstellen*: first, *Vorstellen* is translated as “representational thought” because (a) this is the sense it has in these lectures and in Heidegger in general, and (b) because it keeps representation as a form of thought before our eyes; second, *das Ge-Stell* has been translated as “the en-framing” because it is related not only to *Stellen* but also to the formation and continuation of the world-picture, that is, the “world as picture.” Man *puts* or *places* the world in a *frame* like a picture by *viewing* it as such and as the *product* of his *representation* of it. On this see especially the first and second sections of Professor Weizsäcker’s lecture. It may also be noted that the *activity* of framing or structuring reality like a product is preserved in the term “en-framing.”

die Unverborgenheit: unconcealment
die Ursprung: origin
ursprünglich: originary, original

verändern: to change, alter

die Vergessenheit: forgetfulness, oblivion

das Verhalten: comportment, behavior

HEIDEGGER MEMORIAL LECTURES

verschliessen: to close off

die Verschlossenheit: closing off

die Wahrheit: truth

der Wandel: transformation

sich wandeln: self-transforming

(sich) verwandeln: to transform

wahren: to preserve

verwahren: to conserve

das Wesen: essence

wesen: to essence

(*Wesen* used as a verb signifies that something comes to presence as that which it is, in other words, that something comes to be in the way proper to it. The use of *wesen* as a verb is a further attempt by Heidegger to break free of the traditional distinction of *essentia* and *existentia* and to reintroduce the temporal character of Being.)

A 039 129
THEOLOGY LIBRARY
CLAREMONT, CALIF.